DOCUMENT RESUME

ED 126 024 95 SP 010 218

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TITLE Educational Research and Development: The Next Decade. Occasional Paper No. 11.
INSTITUTION Stanford Univ., Calif. Stanford Center for Research and Development in Teaching.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
REPORT NO SCRDT-Occ Pap-11
PUB DATE Jun 76
NOTE 38p.

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS *Educational Development; Educational History; Educational Innovation; *Educational Research; Experiments; *Federal Aid; Federal Legislation; Information Dissemination; Program Planning; *Research and Development Centers; *Research Needs; Research Utilization; Trend Analysis

ABSTRACT

Educational research and development (educational R&D), more recently called educational knowledge production and utilization, has become a prominent feature of the educational scene with many of its salient characteristics having taken shape during the last ten years. The federal role in educational R&D began in 1867 with the formation of the National Department of Education. The passage of the Cooperative Research Act of 1954, the National Defense Education Act of 1958, and the creation of the National Institute of Education in 1972 expressed federal concern for stepping up efforts to improve the educational system. Although funds have decreased during the last decade, educational R&D laboratories and centers have prospered. One benefit gained recently from educational R&D is that the monolithic structure of the school system is giving way to a greater recognintion of differences among individuals. In general, the effects of educational R&D upon educational practice have been disappointing because the effort has been too small, the trained researchers too few, and the resources too limited. An 11-point agenda for educational R&D during the next decade includes: (1) building a constituency; (2) broadening the collegial base; (3) strengthening all parts of the educational R&D enterprise; (4) recognizing that education is a total system; (5) shifting emphasis from correlational studies and single-variable experimental studies to more complex experimental studies, interventions, and clinical analyses; (6) making more modest claims; (7) building a better national educational R&D agenda; (8) effectively advancing the interdisciplinary claims of educational R&D; (9) strengthening university participation in educational R&D; (10) increasing attention to cost/benefit consideration; (11) reestablishing the upward trend of expenditures for educational R&D. (SK)

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Occasional Paper No. 11

EDUCATIONAL RESEARCH AND DEVELOPMENT: THE NEXT DECADE

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June 1976

Published by the Stanford Center for Research and Development in Teaching, supported in part as a research and development center by funds from the National Institute of Education, U. S. Department of Health, Education, and Welfare. The opinions expressed in this publication do not necessarily reflect the position, policy, or endorsement of the National Institute of Education.

Introductory Statement

The mission of the Stanford Center for Research and Development in Teaching is to improve teaching in American schools. Current major operations include three research and development programs--Teaching Effectiveness, The Environment for Teaching, and Teaching and Linguistic Pluralism--and two programs combining research and technical assistance, the Stanford Urban/Rural Leadership Training Institute and the Hoover/Stanford Teacher Corps Project. The ERIC Clearinghouse on Information Resources is also a part of the Center. A program of exploratory and related studies provides for smaller studies not part of the major programs.

This paper reflects a decade of experience by its author, who served as director of the Center from 1965 through 1976.

EDUCATIONAL RESEARCH AND DEVELOPMENT: THE NEXT DECADE

Robert N. Bush

Educational research and development has become a prominent feature of the educational scene today, with many of its salient characteristics having taken shape during the last ten years. It has been my good fortune to play some part in this shaping. Taking advantage of that experience, I wish to consider what educational R&D may become in the future if it will learn from the lessons of the last decade of experience.

The outline is as follows: first, a definition of educational R&D; second, a warning about my biases--I prefer to call them my "thoughtful assumptions"; third, some history--going back as far as 100 years but mostly covering the last ten years during which educational R&D has become a more active force; finally, speculation about the future, not so much by way of prediction, but more in the nature of the lessons we have learned that may help us into the next decade.

Definition

What do I mean when I use the words "educational research and development (educational R&D)" -- words that have become such a prominent part of the current educational landscape? A new set of words, meaning almost the same, is now coming

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Adapted from an address given at the Stanford Education Alumni Dinner during the San Francisco meeting of the American Educational Research Association, April 19, 1976. The author served as director of the Stanford Center for Research and Development in Teaching from 1965 through August, 1976.

into prominence: "knowledge production and utilization (KPU)". Guba and Clark, in an interesting discussion in a paper entitled "The Configurational Perspective: A View of Educational Knowledge Production and Utilization" (Guba & Clark, 1975), prefer KPU to educational R&D. They consider the term to be more comprehensive in its greater emphasis upon the use of knowledge and products to improve schools. In this discussion, I use the terms interchangeably, but preferring educational R&D. Guba and Clark argue that KPU efforts, especially those of the federal government, have fallen far short of their mark, mainly because of a faculty conceptualization of the process. This they attempt to remedy by their "configurational" concept, which is opposed to the more traditional linear model.

Interestingly, both the educational R&D and the KPU concepts derive from the non-academic world, primarily from business, industry, agriculture, and space. This is nothing new, as education has always borrowed concepts and practices from other fields -- not always to our advantage. My definition of educational R&D in academic terms, at the simplest and most parsimonious level, includes (a) discovery of new knowledge and its application in the solution of problems, and (b) the relating of theory and practice. The weakness of the links between these two facets has long been a continuing lament both among ourselves and on the part of the public.

The discovery of knowledge and its application, and the relating of theory and practice, are two functions which must be joined. This task lies clearly at the heart of our concern in the Stanford School of Education, which is one of the six professional schools of the university. Educational R&D is concerned with the whole chain, network, or configura-

tion of events and processes denoted by the following words: basic research, applied research, development, laboratory and field testing, experimentation, dissemination, installation, application -- however, whenever, or by whomever they are performed.

Frank Chase, one of the most perceptive students of educational R&D, early captured its essence for me when he testified in 1971 before the U.S. House of Representatives Select Subcommittee on Education. In reviewing for them the history of labs and centers, he stated:

> One characteristic (of the labs and centers) is the(ir) systematic attempt to work out cycles of need assessment, specification of objectives, analysis of alternative strategies and treatments, leading to choices among alternatives, construction of partial or tentative systems or prototypes of testing under field conditions in a variety of situations and continuing evaluation and refinement. No other educational institutions in our society have committed themselves so fully to this re-cycling of processes until the intended effects are achieved to a satisfactory degree.
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> It is perhaps this characteristic which, although not yet fully realized, most clearly sets aside the operations of these research and development agencies from typical operations in the field of education; and it is this which represents their greatest potential and promise for the improvement of education (Chase, 1971).

While many different groups had been dealing with one or another aspect of this whole process, for the first time during the last decade we have created some institutions whose exclusive attention has been directed to educational R&D, namely the regional educational laboratories and the R&D centers. To conclude my definition statement, let me fall back upon the psychologists, who when pressed too hard for definitions of intelligence tend to reply "Intelligence

is what intelligence tests measure". We might say with some truth that "educational R&D is what these new R&D institutions are doing."

My Personal Perspective

In approaching the subject, I draw upon ten years devoted almost wholly to work in the Stanford Center for Research and Development in Teaching. How did I first get into this work? During the previous decade and a half, 1950 to 1965, I had been studying the nature of secondary education and ways in which it could be improved. I became increasingly convinced of the central role of teachers and of the importance of their education and re-education. During that period, we secured a grant from the Ford Foundation to develop some experimental work. This was an interesting and productive period in which we tried out some experimental teacher training programs, developed new procedures for teacher training such as micro-teaching, developed new means for making schools more flexible, using computers to provide schedules, and formulated concepts of technical skills and professional decision making in teaching, which helped lay the basis for the current work in performance-based teacher education.

But a fundamental lack in all of this work was a solid knowledge base to sustain and illuminate experimental practices. Consequently, when the federal government decided to establish some educational R&D capability, we coalesced a number of interests in the School and made a proposal for an R&D Center that might help remedy this insufficient knowledge base. The names of those faculty members who joined in making the proposal for the Center include Nate Gage, Dwight Allen, Edward Begle, Norman Boyan, Lee Cronbach, Alfred Grommon, Richard Gross, John Krumboltz, Nathan Maccoby, Frederick

McDonald, Robert Politzer, Pauline Sears, Fanny Shaftel, Wesley Sowards, and myself. It was an interesting group and we got off to a good start. Some have since left and new ones have joined -- including, I might add, a group of sociologists (Elizabeth Cohen, Sanford Dornbusch, Richard Scott and John Meyer) who joined the Center almost eight years ago and have been among its most productive members.

I find it clarifying to view the educational world as populated with three kinds of people: (1) the curious, (2) those who wish to do good, and (3) those with a combination of the two qualities. The first two groups need each other and we all need more of the third. Professional schools would be greatly improved if we had more of the third group. It has been my aim at SCRDT to influence the curious to do good and to stimulate the do-gooders to be curious. It is an uphill battle. Nevertheless, it remains a desirable objective. The Center, as I have tried to direct it, represents an attempt to institutionalize that effort. The recent history of our own School of Education has witnessed a marked strengthening of the "curious" side of the ledger, and currently there is a continuous battle to keep it from swamping the number two side. The normal university climate favors the curious, who are indispensable and at their best illuminate the affairs of the world. At their worst, they become narrow and pedantic. Those who wish to improve matters, in their best form, exercise leadership, move institutions and practices significantly forward and improve our daily lives. At worst, they become a menace, promoting change for the sake of change, trying to hurtle us down any pathway that suits their fancy. While I have long been an advocate of the number two view, my bias is toward the curious side. But my chief criticism of this group is their mode of inquiry, which often fails to recognize that the inquiry that leads

to the discovery of new knowledge in the behavioral sciences and in the applied fields is often best pursued in the normal naturalistic arena in which the phenomena under inquiry exist.

Dornbusch at the Center cites some recent views of behavioral scientists who are recognizing this problem. He reports that "Recommendations for future National Institute of Child Health Development research were solicited from senior research psychologists and sociologists...." The results show that "the behavioral science community does not view basic research and applied research as antagonistic, but considers a balance between the two as appropriate both for the development of the science and for the response to society's needs. There was general approval by the behavioral scientists who were polled of the current level of support for both types of research and a desire for increased collaboration of basic and applied researchers. Imaginative and sustained attention to applied research can produce fundamental knowledge" (Dornbusch, personal communication).

Our aim as a professional school should be the improvement of the educational system, not just understanding or changing it. We can and must do better than merely drawing upon the accumulated wisdom of the ages, especially if we wish to keep our educational institutions from breaking down with obsolescence. I am convinced that schools have been important, and will continue to be so in the future. I do not subscribe to the de-schooling of society line of thought. Our main obligation, as I see it, was set forth by the late distinguished and beloved Marcus Foster in the title of his provocative little book: Making Schools Work.

While I am not one of the prophets of the impending doom of the school system, I confess to an increasing disquietude

that we may be losing ground and that education is not moving forward fast enough to keep pace with its surrounding forces. The process that began as far back as Sputnik in the 1950's seems almost to have overwhelmed us. Fred Hechinger, writing in the March 20, 1976 issue of Saturday Review, under an alarming headline entitled "Murder in Academe - the Demise of Education" suggests that as a result of assaults, both from the left and the right, education is literally hanging on the ropes. He claims that we have lost our faith in the efficacy of education and schools to keep our social system open and to keep the streams of upward mobility unclogged. I am not that pessimistic. But a critical question is to how to keep the R&D system moving forward, how to keep it from being turned into a short-lived band wagon, and how to see that the mandate of the Congress to the new but faltering National Institute of Education lives up to the task. To this end, I will later propose an 11-point agenda derived from our experience of the last decade. But before presenting that agenda, I wish to comment on our brief educational R&D history.

The History of Educational R&D-KPU

The federal role in educational R&D may be said to have begun with the formation in 1867 of the National Department of Education. The purpose, as stated in the statute, was "... collecting such statistics and facts as shall show the condition and progress of education in the several states and territories, and of diffusing such information respecting the organization and management of schools and school systems, the methods of teaching, as shall aid the people of the United States in the establishment and maintenance of efficient school systems..." (cited in Clark, 1974). This act remained in place until the passage of the Cooperative

Research Act in 1954. From the establishment of the department down to the mid-1950's, a narrow interpretation was taken of this charge, namely to collect facts and to publish them. But beginning in the mid-1950's, the federal concern for stepping up efforts to improve the educational system began to be felt. The first efforts were to develop new curriculums, especially in science, mathematics and foreign language.

The recent development of R&D institutions (in this country and abroad) has been in response partly to two major forces: (1) large social pressures and problems that appear on the horizon and (2) problems stemming from inadequacies in the educational system itself.

In the first instance, after World War II, the pace of change in all parts of society began to accelerate at an unprecedented rate. Industrial productivity and agricultural output were burgeoning, but the educational system continued to lag further and further behind. Unless the situation changed, it would be impossible to meet the revolution of rising expectations for a better way of life that a global system of communications had communicated to the poor peoples of the world. Genuine national concern for the improvement of the educational system began in the 1950's after the launching of the Russian Sputnik and with the famous Brown Vs. Topeka decision on segregation in schools. New and powerful societal forces began to press for the expansion of education and for increasing its quality and its productivity.

National education leaders then noted that whereas American industry and agriculture had well developed and financed research and development systems which fueled their constantly increasing productivity, education had almost none. Agriculture and industry invested 5% to 10% of their total expenditures in research and development. In education, a

comparable figure is a small fraction of less than 1%. Education spends almost all of its funds in operating the system --almost none in systematic study and the fashioning of new ways to improve it. As a result, tested new methods have been scarce until recently. The time lag in education between the discovery of new knowledge and its widespread application in classrooms is estimated to be between 40 and 50 years; in industry and agriculture it ranges from 3 to 5 years. Industry and agriculture have a long tradition reflected in engineering and in agricultural experiment stations and field agents which provide the bridge between the theoretical knowledge in the scientific fields of biology, physics, chemistry, and agronomy and the practical problem solvers and decision makers in industrial production and farming. A complex system of relationships and institutions encourages the invention and development of new products and their installation in the factories and the farms. Any such pattern was, until recently, almost totally lacking in the social sciences and in the educational system. Educational leaders reasoned that if education could develop an R&D system, it might begin to catch up by improving its efficiency and effectiveness.

Faced with new challenges, we began to look more carefully at why the almost 100 years of limited investment in educational research had not yielded larger dividends. The scientific approach to educational problems (which began with the foundation of a new Federal Department of Education in 1867 but is largely a phenomenon of this century) has really occupied only a short time in historical perspective. Even so, the effects of educational research upon educational practice have been disappointing. I have previously identified several possible reasons (Bush, 1975). The effort has been too small; the trained researchers too few; the resources

too limited; efforts too fragmented. Research has been directed to small, isolated parts of the total system. The methodologies and samples have been so diverse as to preclude cumulative effect. Methods unduly copied designs from the natural sciences and were often inappropriate for the problems under consideration. Most educational research was carried on by individual professors and a few graduate students, working in isolated, doctoral dissertation-sized chunks, whose results were filed, only to gather dust on university library shelves.

The new R&D system, in process of formation during the last decade, is attempting to remedy some of these difficulties. Before attempting to assess its results, let me summarize what I see as the essential ingredients of this R&D approach, again drawing upon a previous paper:

> Systems approach. An overarching feature of the R&D effort in education is its attempt to be comprehensive, to consider all elements.
>
> Critical mass. Successful R&D aims to assemble a "critical mass" of talent that greatly enhances the solution of complex problems.
>
> Interdisciplinary team. Most important educational problems require the full power of many relevant disciplines, e.g., psychology, sociology, anthropology, economics, political science, law, and medicine. R&D institutions are attracting interdisciplinary teams and providing them with a congenial working environment.
>
> Design and field test. The heart of an effective R&D effort is the design and field-test stages of the work. Drawing upon both basic and applied research, the staff engages in the creative task of inventing new solutions to problems, designing new educational products, creating new models. It then tries out these models, first using rigorous tests as to workability in limited field settings, then later in more normal settings. The models or products go through as many tests and revisions as

necessary to reach acceptable levels of performance. This step is quite expensive. But it is a critical step, typically absent in the past in many commercially produced educational products.

Dissemination and installation. The process is not considered complete until the product has been installed and made to work successfully in one or more practical settings. Further, it is also necessary to see that the idea is then made widely known to potential users.

Continuous feedback and revisions. A desirable feature, not yet fully realized, is feedback from users, so that a product can be further modified, or even withdrawn if it begins to work badly or if it produces unanticipated undesirable effects.

Focus on a mission. An effective R&D effort does not dissipate its energies by trying to do everything. It concentrates upon accomplishing a well-defined mission, with explicit objectives which require specific programs and projects.

Visibility and accountability. For the astronauts, the task was clear: they either got to the moon or not. Clearly stating what the mission is and then following all the necessary steps gives a high degree of visibility, which in turn imparts a high degree of accountability to R&D institutions (Bush, 1975, pp. 5-6).

Returning to our brief historical survey, the landmark acts that inaugurated this new attempt at educational R&D were:

1. The Cooperative Research Act, passed in 1954 with an appropriation of approximately $1 million, which was not made available until two years after its initial passage, and then with the proviso that the funds should be spent mostly (two-thirds) on the study of the education of mentally retarded children. This act was the basis for establishing the labs and centers almost 10 years later.

2. The National Defense Education Act, passed in 1958, under which many of the curriculum

development projects were inaugurated after Sputnik.

3. The Elementary and Secondary Education Act of 1965, which amended the Cooperative Research Act.

4. The Education Amendments Act of 1972, which created the National Institute of Education.

Over these 20-plus years the expenditures for educational R&D rose dramatically (that is, dramatically for education, even though the effort remains small by comparison with R&D in fields outside of education) from approximately $1 million in 1954 to $14 million by 1963 and to almost $200 million by 1968. The 1960's were the boom decade. Immediately after the creation of NIE in 1972, however, the top was reached, and it has been declining since then. Thus in 1954 began a long and torturous journey to build an educational R&D system, in the face of what Steven Bailey has characterized as "... the hoary notion that the federal government should leave the direction of education to the mercies of pluralistic and often contentious centers of decentralized authority." The results are claimed to be either impressive or dismal, depending upon the "expert consultant." My conservative answer is that the case for educational R&D is promising -- but not fully proven. Obviously, the millenium has not arrived. The educational system has not been dramatically transformed in the past ten years. And indeed, this should not have been our expectation.

Some significant beginnings can be seen. In the first place, the monolithic structure of the school system, which attempted to cast everyone into a common mold, is giving way to a greater recognition of differences among individuals and of groups. In part this has come about in response to powerful social forces that are moving the whole society.

But our educational institutions would have been unable to respond to these social forces had not the educational R&D community produced materials and procedures that enabled school systems and teachers to begin successfully to offer more pluralistic and alternative programs. An increasing array of new, imaginative, and tested products is beginning to appear on the educational market. The Fourth Edition of the CEDaR Catalog, published in April 1974 (CEDaR is the acronym of the Council for Educational Development and Research, which is the national organization of educational R&D labs and centers) describes in its first volume 250 completed and available products, and in its second volume, 162 anticipated products that will be available within a year or two.

The number of instructional packages available for classroom use that go beyond simple textbooks is mounting. So too, are the manuals, training systems, and other means for showing educational personnel how to use these products successfully. The number, variety, and quality of these products is significantly greater than was true ten years ago, when the production of instructional materials was left almost solely to the private sector and to individuals working alone in colleges and universities.

Educational R&D has contributed to the reform of traditionally weak teacher-training practices. Teacher education is moving out from the relative isolation of college and university settings into the more practical and field settings of the "real" educational world. Powerful new training packages are increasingly becoming available for the development of the competencies that have been identified and validated by R&D efforts. The increasing flexibility of the educational system in responding successfully to the diverse

needs of individuals and groups is beginning to be more firmly based in fundamental research about the different ways that individuals learn best and about the different kinds and styles of teaching which are accordingly most appropriate.

Nevertheless, the results have not been as good as we had hoped for or promised and certainly not as far-reaching or valuable as many proponents claim. The results of the projects did not, in the view of some Congressmen, taxpayers, and practitioners in the field, lead directly or quickly enough to observable changes and desired improvements in educational practice. That more was not accomplished in the short period of time is not surprising when we consider the accelerated pace of the early effort. As we began to undertake this new push in educational R&D, unprecedented accomplishments in establishing new institutions took place. Within two years after the passage of the authorizing legislation, ESEA in 1965, 21 R&D centers, ten of them university-based, had been created, and 20 regional laboratories and 100 research and development training programs had been set up. A national educational information retrieval system, ERIC, had been established, and thousands of Title III projects were funded to see that the products of educational R&D were transmitted to and used in the schools. With such a frantic scrambling to build a new capability, many horror stories were predictably reported.

Unrealistic expectations for, and erratic treatment of, education are not new. When President Andrew Johnson appointed Henry Barnard as the first Commissioner of Education in March of 1867, immediate disenchantment set in. By July 1868, less than two months after Barnard submitted his first annual report to the Congress, the appropriation for the new agency was reduced from $12,000 to $9,400 and Barnard and his three

clerks were moved to a minor office in the U.S. Department of Interior. The NIE may take some small comfort from the fact that its treatment is not unprecedented.

In retrospect, the R&D effort during the last decade can be seen as having been besieged by "cannibalistic" practices, in which each year, the Office of Education, faced with a shortage of funds, decided to eliminate one or more of the so-called weakest institutions so that funds would be available for the stronger ones. This was not exactly a morale-inducing procedure. Individual researchers, who had previously secured support through the field-initiated studies program protested that the then new institutions were draining funds away from them. A highly promising research training program was aborted just as its first group of graduates began to move into the field. Moreover, just as the surviving R&D institutions were beginning to flourish, the policy of the government changed from one of institutional support to that of program purchase. The alleged bad management of educational R&D by OE, which had been one of the main motivations for the creation of the NIE, carried over to NIE and at times became even worse. This situation is now changing for the better under the new director of NIE.

In spite of these difficulties and problems, however, the educational R&D system and the labs and centers prospered; under adversity they became stronger and more robust, until they emerged as one of the leading spokesmen for educational R&D in the country and have increasingly been looked upon as prominent contributors to the improvement of educational practices. Several recent surveys, both by NIE and by independent agencies, of promising new educational products that are appearing on the horizon reveal that the majority of them have come from the laboratories and the centers.

The Next Decade

Even with the considerable turbulence and trouble of the past 10 to 15 years, we are in my judgment on the verge of a burgeoning creative decade ahead if we will pay attention to some of the lessons that we have learned. Drawing from these lessons, I offer an 11-point agenda for educational R&D during the next decade.

1. Build a constituency.

What should have been understood earlier but was not until the crunch came in Congress in 1974 when Edith Green recommended zero funding for NIE, was that the educational community as a whole did not seem to care about or understand educational R&D and felt little touched by it. This is not to say that there had not been much good work done but rather that "those out there," presumably the beneficiaries of educational R&D, simply were not informed and operated not only out of ignorance but often from ancient and deep-seated beliefs about the esoteric character of educational research. By virtue of the painful lesson of prospective zero funding in the Congress, we have tardily begun systematic substantial efforts to build a constituency for educational R&D. The Council for Educational Development and Research (CEDaR), an organization formed by the labs and centers several years ago, has taken active leadership in this effort -- not without opposition from some in the educational (research) community.

The lesson to be learned is that those who have been the principal figures in educational research in the past, that is, those in the colleges and universities, must come out of their isolation and join hands as equal colleagues with all elements in the educational community. Among the critical actors who have not heretofore been fully recognized are the state departments of education, local education

agencies, professional educational associations, administrators, and teachers. Nothing short of such a partnership will enable us to build the kind of constituency that will be persuasive to state and federal legislators and others who are in charge of funds for education.

2. Broaden the collegial base.

It is time for us to begin to think, to believe, and to behave differently about who are the contributing colleagues in the educational R&D enterprise. A main requirement is to get rid of the "practitioner as dunce" syndrome, especially as held by those in the universities. Another stereotype that needs dismantling is that of universities as producers, and practitioners as consumers, of research. Indeed, it seems to me that as our practices and beliefs change to reflect a genuine partnership, we need to develop some new terminology which reflects that there are different kinds of persons who participate in R&D, but that they are differentiated horizontally, not vertically; consider, for example, those who are discipline-oriented and those who are clinically-oriented. In addition to those who work in the universities and in the regional laboratories, there is a substantial group in private, non-profit educational corporations who contribute significantly. There are competent R&D persons in state and local educational agencies and in the large network of Title III centers, which have thus far been largely overlooked.

Educational R&D institutions should in the next decade be looked upon increasingly as a rewarding place for larger numbers of post-doctoral fellows and those who would profit from mid-career refreshment of their professional careers in teaching and administration. In achieving this collaborative effort, we need to understand that educational R&D at its

best will bring the classrooms of a nation into vital contact with the current issues of society and the frontiers of knowledge.

3. Strengthen all parts of the R&D enterprise.

Discussion of educational R&D is currently filled with lively debate concerning which parts of the system need the largest expenditures, with each segment arguing for a larger share. Last year, the original proposal for NIE's budget provided for tripling expenditures for dissemination without any increase in the total, which meant cutting back on development -- amid loud outcries from the developers. The researchers claim that NIE is still spending almost nothing on research. And so the argument goes. In the next decade, it must be recognized that the total system needs developing, and that those parts which have been weakest or almost nonexistent in the past need to be brought up to decent levels of performance.

4. Recognize that education is a total system.

One significant lesson of the last decade is that substantial improvement of education for students cannot be achieved by manipulating one or another isolated part of the system. Frank Chase points out that "attention to all elements crucial to system performance is something new in education." He goes on to indicate that laboratories and centers have advanced "a long way from the naive belief that great improvements in education will spring from such piecemeal reforms as introducing a new method of instruction or in-service education, re-grouping learners, organizing teachers into teams, or adopting programmed instruction. They recognize the importance of compatible systems in which behavior of persons, media of communications, and the context of communications, the scheduling of activities, the reward system,

and many other factors operate to produce effects. They are therefore as concerned in helping school personnel to acquire needed skills and confidence in new roles as they are in developing instructional materials or management systems" (Chase, 1971).

Improving the training of teachers and administrators, advancing organizational development, and producing new instructional materials are all important activities; no one is sufficient. This we did not know or see so clearly at the beginning of the decade, as different labs and centers undertook to change one or another of these aspects. As the history of labs and centers has shown, those who were concerned with educational products soon became involved in teacher training. Those concerned primarily in the beginning with teacher training often soon moved into the production of educational materials. Most have seen the necessity for becoming concerned with organizational matters. Not all can do everything. There must be specialization, but there must also be articulation amongst the various parts.

5. Shift emphasis from correlational studies and single-variable experimental studies to more complex experimental studies, interventions, and clinical analyses.

The bulk of educational research, particularly on instruction, has relied heavily upon correlational studies. As a result of their inconclusiveness and of our dawning realization of the Gestalt character of the variables influencing educational achievement, we can note a beginning trend toward fashioning promising interventions, making comprehensive approaches to improving classrooms, and evaluating these new interventions in a model of successive approximations until a more powerful program is developed, in contrast to the more traditional correlational and single-variable experimental

studies. This trend needs to be encouraged.

6. Make more modest claims.

We need to come down from our evangelical pulpits in proposing educational solutions and promising instant results. When, during the past ten years, the prospect of some funds for educational R&D at long last began to appear, proposers tended to overstate anticipated results. One of the gains of the past decade has been results from behavioral science studies that have informed the public, as well as ourselves, that education is not a panacea, and that schooling is not all-powerful. We should not now go to the extreme of "de-schooling society." But we should not mislead ourselves or others about how much education can accomplish. We must be clear that time will be required to fashion new procedures and programs and to put them into operation.

Nonetheless, those engaged in R&D do need some projects that can show relatively quick results. While healthy R&D organizations need projects with short-term, middle-range, and long-range payoffs, it is important to heed the results of a year-long inquiry into "Basic Innovations in the Social Sciences," reported recently in the New York Times, which states as one of its conclusions that the first major impact of an advance is generally delayed by 10-15 years, and that research should be supported in 10- to 15-year blocks to consolidate advances (New York Times, 1971).

7. Build a better national educational research and development agenda.

This is one of the most important matters for attention during the next decade. No definitive and acceptable national educational research and development agenda currently exists. To the extent that any national agenda exists, either

explicitly or implicitly, in the educational R&D programs now being funded, it consists to a large extent of bits and pieces that fortuitously emerged as new actors entered the picture over the last decade. The original labs and centers were not the result of an attempt to fund programs to fit a national agenda. Inasmuch as NIE is now charged with the responsibility for developing a national R&D system, it is essential that a compelling national educational R&D agenda be formulated to serve as a guideline, not only for the expenditures of NIE, but for those of other organizations who are concerned with educational improvement. This is not the time or place to suggest how this problem might be approached. What must, and I believe can, be achieved is an agenda derived from a healthy interaction of vigorous grass-roots contributors with thoughtful national leadership, not concentrated in any one branch of government or segment of the profession.

As a footnote to the national agenda-setting process, I comment on several areas of importance that SCRDT might consider, beyond our attention to teaching and teacher education of the last decade. Let me mention five areas that I think might well be attended to both because of our particular array of talent at Stanford and because of national needs.

First is the area of policy studies. We repeatedly embark upon large spending that stems from assumptions and educational policies that have little or no foundation in fact. Both the press and professional literature daily abound with new examples. Stephen Bailey, for example, recently pointed to one such situation while discussing the efficiency of spending billions of dollars to help millions of underachievers in our schools, with the comment that "the evidence is increasingly clear that our educational system is woefully unprepared to use marginal additional money

effectively for the redress of educational disadvantage" (Bailey, 1970). Currently, there is great emphasis upon "mainstreaming." In a recent issue of Education Daily, the testimony of Yale psychologist Ed Zigler to Congress concerning support for research on the mentally retarded is headlined as "skeptical on mainstreaming." Zigler pointed out that several years ago experts convinced decision makers that special education was the solution to the problem of training the mentally retarded. Now that special education is looked upon as an undesirable form of grouping or segregation, the pendulum begins to swing in the opposite direction. Decision makers are now committing themselves to such concepts as "normalization" and "de-institutionalization" under the heading of "mainstreaming." Zigler states: "I join with my senior workers in the field who view these concepts as little more than slogans that are badly in need of a data base." Yet we already find states passing laws mandating mainstreaming before there are any basic data to support it. As Zigler says, "It makes little sense to appropriate hundreds of millions of dollars on questionable social practices and fail to find a few million for researchers committed to discovering the actual effects of such practices " (Education Daily, March 22, 1976).

These illustrations underline the need for greater attention to policy studies in the next decade. Stanford is uniquely qualified in this regard.

A second area has to do with productivity, instructional improvement, and organizational development in higher education. The cost problem in post-secondary education is especially severe, because the per-unit cost of instruction is much greater than in the lower schools.

SCRDT has a unique opportunity to contribute to the

improvement of instruction and the furtherance of organizational development at the higher education levels. We can build here on current efforts in instructional improvement in the Stanford School of Humanities and Sciences, supported by private foundations; earlier work at the Center, especially by sociologists; and current expertise in organizational theory and instructional technology in the School of Education and in the departments of communication, sociology, political science, and philosophy as well as in top levels of the administration in the university.

A unique resource is the SCRDT teaching laboratory. This facility, located in the central area of the university, is a tool for studying instruction in its various forms -- large groups, regular classes, small groups, tutorials, and student-machine interaction. The vision behind this facility was aimed toward experimental work on methods for improving the effectiveness and efficiency of university instruction, especially at Stanford. Because of reduced federal funding for educational R&D, the support to develop the software and for experimentation has not yet permitted the full use of this unique facility. Fortunately, the building was planned flexibly for changing use so that space has not been wasted. However, there is technological equipment which could be brought to bear on pressing problems in tertiary education which we hope to engage in our future work. These efforts envision a greater use of computers, videotapes, and other media for improving the efficiency of teaching.

Despite future financial stringencies in higher education, courses will be required in areas which do not currently enroll large numbers of students but which are essential for a curriculum of the highest caliber. Production of instructional programs that can be stored and retrieved for use

by individual students as a means of enriching the curriculum, of adjusting the pace of instruction to individual needs, and ultimately of providing a saving of highly skilled instructional time is one aim of this exploratory development.

Third, we need to redress an imbalance of the last decade by bringing to bear the force of humanistic and artistic studies upon our inquiries, particularly as they bear upon the field of instruction. We have made a small beginning in our Center through the work of Elliot Eisner, but not nearly as much as there should be in the next decade. I sounded this note about a decade ago in a national Phi Delta Kappa symposium at Stanford (Bush, 1966). I now see some promising beginnings but they are slow in coming.

Fourth, we can direct attention to the ethnic and culturally pluralistic dimensions of educational institutions. Several Center programs are now aimed at the areas of educational equity and ethnic and cultural pluralism. Our society has achieved improvements during the past decade, but the work scarcely begun remains as urgent as ever. SCRDT could expand its work on technical problems of achieving equity through the organization, teaching, and curriculum of the schools. As an R&D center, it could also engage faculty who can help clarify the normative-philosophical questions raised by the claim that our nation should move from a melting pot to a culturally pluralistic society.

Finally, we should accelerate our attempts to internationalize and interculturize our approaches. We have as much to learn from as to teach our friends from other climes and cultures in the field of education. It is surely true, as Philip Coombs has stated, that there is little distinction between the so-called "developed" and the so-called "underdeveloped" countries in education: we are all underdeveloped.

We should move in the next decade more to a mutual problem-solving stance, in which international and interdisciplinary teams work together in different cultural field settings on mutually important educational R&D problems. The beginnings of such activities are just emerging. A readiness for this development is attested to by our experience, for example, in Brazil, where we have been laying the foundation for the collaboration on some mutual problems, such as improving university teaching, by several Brazilian institutions and several U.S. R&D groups, including our Center at Stanford.

These are five elements that might well be considered as SCRDT builds its program in the next decade and plays its part in strengthening the national agenda for educational R&D.

8. Effectively advance the interdisciplinary claims of educational R&D.

During the next decade we need to make good our interdisciplinary claims. One basic element in the argument for large-scale, programmatic R&D has been the need for a genuine interdisciplinary approach to the solution of important educational problems. Psychology has no monopoly on the improvement of classroom instruction, even though it has a central role. The importance of the organization of the school and the classroom requires more than the insights of sociology, although these are basic. Greater cost effectiveness in operating schools and classrooms requires the major contribution of economics but is surely not limited to this discipline.

An honest appraisal must conclude that interdisciplinary efforts in educational R&D have fallen far short of our needs and our assertions. At SCRDT, the sociologists still don't

talk or collaborate much with the psychologists. When I gently chide them, they argue that first the researchers in one discipline must learn to talk and work with the practitioners. Once they have mastered this art, they say, they will then turn to talk and work with another discipline. They have a point. The results have been productive when disciplinarians work with the practitioners. When the scholars become involved and begin to see how their work can make a difference in improving schools, they gain real satisfaction and increase their attention to such work. But the results are even greater when the scholar-practitioner collaboration becomes interdisciplinary. Genuine and productive interdisciplinary work does not occur readily. It requires, in addition to resolve, attitude, training, and skill. The setting for interdisciplinary interaction lies in a willingness to work, for at least part of our time, on a concrete, specific problem with colleagues in another discipline -- sometimes as learners, sometimes as teachers. As Cunningham states, "the university must accept the premise that the establishment of interdisciplinary research centers actually represents the next stage in the evolution of the university" (Cunningham, 1969). More concrete action and less lip service to interdisciplinary work is important for the next decade.

9. Strengthen University participation in educational R&D.

The university partner in educational R&D needs to redouble its effort, become increasingly effective, and not retreat to a "basic research" position which is its natural habit. The university has gained a fundamental and indispensable role in educational R&D during the past decade which must not be lost. But educational R&D has been an unsettling element in the university setting. It still rests uneasily. Of the three places that like to think of themselves as some-

what similar (Harvard, Chicago, and Stanford) in only one did R&D take root. For one reason or another, the University of Chicago never had an R&D Center, although it has been a productive critic and supporter of the movement. Harvard discontinued its center after several years. However, the concept has taken deep root at the University of Wisconsin, the University of Pittsburgh, Texas, UCLA, the University of Oregon, and Ohio State University, to mention a few in addition to Stanford.

In the 1972 AERA meeting Herzog, in explaining Harvard's decision, indicated that "the template for Harvard's R&D directors was not the county agricultural agent, but the medieval marriage broker who arranged meetings of parties who otherwise could not find each other" (Herzog, 1972). While the analogy is delightfully amusing, 20th-century educational effort needs something more powerful than a medieval model. Although we should not slavishly follow agricultural or industrial models, current behavioral science has more to offer than a marriage-broker model.

There are a variety of ways for the university community to contribute to educational improvement, in addition to its traditional basic research route. But while expanding this effort, we should also continue to build on the strength of the educational R&D center model in the university setting, which has been developed during the last decade. It has been a significant step forward to encourage groups of university faculty to work together on important educational problems so that their work and that of their graduate students becomes cumulative in the solution of larger problems.

Indeed, one of the chief values of our work in SCRDT, as I have indicated many times, may be the over 100 doctoral students who have worked with the members of the faculty in

the process of earning their degrees and have themselves become skilled in educational R&D work. One of the reasons that R&D did not move forward more rapidly and that some earlier institutions faltered or failed was the lack of an adequate supply of personnel.

As Professor Hilgard points out, "The educational R&D mode of training and socializing new researchers will be helpful in overcoming some of the prejudices that have existed in the past.... Prestige and rewards for work well done needs to be spread across the field from the basic to the most technological and applied" (Hilgard, 1969). The need for collaborative effort was referred to in the Stanford University School of Education Futures Report in 1971, which stated: "Faculty in the school have expressed...the desire to cooperate in team ventures which might have an impact on educational practice...focusing...on key problems."

The university has an important leadership role to play in seeing that the relationships between basic research, applied research, development, and dissemination are placed in balance.

10. Increase attention to cost/benefits considerations.

Efficiency has never been a very popular word in educational circles. But given the circumstances of the times, it will be increasingly necessary to consider the relative benefits of different procedures and programs in terms of their economic, political, and social costs. Among the relatively unexplored areas which are being advanced by some of my colleagues in the School of Education are these:

a. The effects on productivity of shortening or lengthening the educational cycle under possible alternative arrangements.

b. The development of cost-effectiveness models for assessing productivity in education and conducting such assessments.

c. Optimal use of time, technology, and facilities in improving educational output.

d. Evaluation of current alternatives to formal schooling and generation and testing of new alternatives.

e. Impact of collective bargaining on the effectiveness and the distribution of educational resources.

f. The bearing of organizational contexts and characteristics on effectiveness and efficiency in education.

11. Re-establish the upward trend of expenditures for educational R&D.

We need in this next decade to recover, to re-establish the upward trajectory of funding for educational R&D which marked the beginning of the last decade. This problem merits the direct attack it has been receiving. Small results are beginning to show, but large results will probably be forthcoming as we make achievements towards the foregoing ten goals which I have enumerated.

It should be noted that R&D centers and laboratories have suffered from an almost total lack of discretionary funding. In a study of successful R&D efforts, Carter at Rand (1966) found that 43 of 63 events which launched these successful efforts (both in and outside of education) were discretionary expenditures rather than expenditures which had been allocated for that particular development. Some way needs to be found in the next decade to provide educational R&D institutions with some relatively free money to increase their creative potential.

Concluding Remarks

I come then in closing to call for the continuing of educational R&D in the university as well as elsewhere, not alone for what it has been but for what it has the potential for becoming. In an essay entitled "Thoughts on an Uncharted Future" in the 1975 issue of Daedelus devoted to American Higher Education: Toward an Uncertain Future, Caryl P. Haskins, former president of the Carnegie Institution in Washington, D.C., discusses what may be learned from a "handful of centers of teaching and research at the forefront of scientific endeavor which, here and abroad, have provided so many remarkable leaders over the years" (Haskins, 1975). He points to the importance of senior investigators and teachers working closely with the younger persons, on an almost apprentice basis, in a particular kind of environment, where there are free and flexible small groups working around a few leaders of stature. Here it is, he claims, "that the pathbreakers of the next generation have developed." After describing the unusual productivity of several nontraditional -- and non-university -- centers he concludes, "It would be hard to find a more dramatic example of the place of the research-cum-teaching institution and the flexible center of excellence in the moulding of scientific leadership of a critically important kind."

Perhaps the most elusive and least well understood idea in the R&D approach to educational problems is that we should not expect to find an answer, that is a final answer. It is rather an emphasis upon the process of answering. To buttress his assertion that "every university should establish a program of research and development in the art and science of teaching," my mentor and first professor of higher education in the Stanford School of Education, Alvin C. Eurich, in

Reforming American Education, explains that "There are no fixed answers to pressing questions about human learning and growth and development. That is why I consider the innovative approach the most promising: because its essence is the effort--continuous and unrelenting -- to find the best possible 'answers' and then push on to find new and better ones" (Eurich, 1969).

It was pointed out in a recent report to the Congress that"The lab and center people ... live in a state of excitement partly generated by the fact that they are close to the scene of action and partly because they are close to the sources of knowledge. It is a conjunction of the knowledge as it is being created with its application on the scene of action where it affects the children, the parents, the teachers that generates this excitement" (Chase, 1971).

Building upon this excitement and drawing constructively on the experience of the last decade in R&D, I am confident that we will move on to greater educational achievement in the decade ahead, not only in the university, but in the educational system as a whole, here and abroad.

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